What is claimed is:

1. An acoustic noise reduction system for reducing the effects of a noise source, comprising:

input transducer means for sensing the acoustic noise field generated by the noise source and for generating an input signal therefrom;

output actuator means for generating an acoustic output field that is effective to reduce the level of the acoustic noise field;

correction means for adjusting the input signal generated by said input transducer to compensate for the non linear characteristics of said input transducer and output actuator;

echo cancellation means for removing from the input signal a portion of the output of said output actuator means fed back through said input transducer means, the output of said echo cancellation means representing a signal corresponding to substantially the noise source by itself;

antinoise means for generating an antinoise signal opposite in phase to said input signal, said output actuator means generating said acoustic output field from said antinoise signal; and

wherein said input transducer means is located in relatively close proximity to said output actuator means.

2. The system according to claim 1, wherein said input transducer means comprises a microphone.

3. The system according to claim 1, wherein said output actuator means comprises at least one loudspeaker.

4. The system according to claim 1, wherein said correction means comprises:

storage means for storing a plurality of coefficients;

coefficient processing means for dynamically updating the values of said plurality of coefficients stored in said storage means; and

means for generating a corrected input signal from the contents of said storage means and said input signal.

5. The system according to claim 4, wherein said means for generating a corrected input signal comprises a multiplier.

6. The system according to claim 4, wherein said storage means is divided into regions whereby a particular range of input signal values map to the same coefficient value.

7. The system according to claim 1, further comprising calibration means for dynamically updating said correction means in response to the input signal and the output of said correction means.

8. The system according to claim 1, further comprising an equalizer for compensating the frequency response gain and group delay of said system.

9. The system according to claim 1, wherein said echo cancellation means comprises:

a digital filter having a delay line with a number of taps whose total delay time is equivalent to at least a system time delay of said noise reduction system;

adaptation means for dynamically adjusting the coefficient values associated with each of the taps of said digital filter; and

summing means for adding the output of said digital filter with the output of said correction means.

10. The system according to claim 1, wherein said echo cancellation means comprises:

a shift register whose parallel outputs are divided into a plurality of N portions;

a plurality of N finite impulse response (FIR) means wherein each N^{th} portion of said shift register coupled to the input of the N^{th} FIR means;

a plurality of N adaptation circuits wherein one adaptation circuit is associated with each of N FIR means; and

wherein said N FIR means combine to yield an FIR filter whose length is equivalent to the combined length of said N FIR means, whereby the length of each FIR means is less then or equal to the period of a noise cycle.

11. The system according to claim 1, wherein said antinoise means comprises:

a variable gain amplifier operative to generate an amplified signal 180 degrees opposite in phase from said input signal; and

gain control means for dynamically controlling the gain of said variable gain amplifier.

12. The system according to claim 11, wherein said gain control means is adapted to receive a manual input control signal from a user which determines the gain of said variable gain amplifier, said user able to vary the location of a quiet zone generated by said system by varying said input control signal.

13. The system according to claim 12, wherein said input control signal is generated by said user remotely from said system and transmitted to said system via wireless communication means.

14. The system according to claim 1, further comprising anti alias filter means for removing alias frequencies from said input signal.

15. The system according to claim 14, wherein said anti alias filter means comprises a low pass filter having a cutoff frequency sufficiently high enough so as to reject frequencies greater then the sampling rate utilized within said system.

16. The system according to claim 1, further comprising a low pass filter operative to reduce oscillations present in the system derived from feedback of the acoustic output field to said input transducer.

17. The system according to claim 1, further comprising delay cancellation means for reducing the effect of echo signals caused by said antinoise means sensed by said input transducer.

18. The system according to claim 17, wherein said delay cancellation means comprises a digital filter whose output is added to the output of said antinoise means.

19. The system according to claim 17, wherein said delay cancellation means comprises a plurality of delay cancellation circuits wherein each delay cancellation circuit is operative to reduce the effect of the echo caused by previous delay cancellation circuits.

20. The system according to claim 18, wherein said digital filter comprises a finite impulse response (FIR) digital filter.

21. The system according to claim 1, further comprising means for sampling the acoustic noise field at a sampling rate approximately 1000 times or greater than the frequency of the noise source.

22. The system according to claim 1, wherein said system is operative to generate a controlled far field quiet zone.

23. The system according to claim 1, further comprising means for sampling a particular point of the noise source having an arbitrary phase and effectively canceling noise radiated from other points of the noise source having the same phase.

24. The system according to claim 1, wherein said input transducer means comprises a single microphone, said output actuator means comprises a plurality of loudspeakers arranged so as to radiate energy over a wide angle.

25. The system according to claim 1, wherein said input transducer means comprises a single microphone, said output actuator means comprises a plurality of loudspeakers arranged in linear fashion, each loudspeaker radiating energy in the same direction so as to create a wall of silence.

26. The system according to claim 1, wherein said input transducer means and said output actuator means are implemented as a single input/output (I/O) hybrid device.

27. The system according to claim 1, further comprising means for generating an audio source from said output actuator means.

28. An acoustic noise reduction system for reducing the effects of a noise source, comprising:

input transducer means for sensing the acoustic noise field generated by the noise source and for generating an input signal therefrom;

output actuator means for generating an acoustic output field that is effective to reduce the level of the acoustic noise field;

correction means for adjusting the input signal generated by said input transducer to compensate for the non linear characteristics of said input transducer;

input decoding means for removing extraneous signals from said input signal so as to generate a signal corresponding to substantially the noise source alone;

antinoise means for generating an antinoise signal opposite in phase to said input signal, said output actuator means generating said acoustic output field from said antinoise signal; and

wherein said input transducer means is located in relatively close proximity to said output actuator means.

29. The system according to claim 28, wherein said input transducer means comprises a microphone.

30. The system according to claim 28, wherein said output actuator means comprises at least one loudspeaker.

31. The system according to claim 28, wherein said correction means comprises:

storage means for storing a plurality of coefficients;

sigma generating means for outputting a signal corresponding to substantially the noise source only;

coefficient processing means for dynamically updating the values of said plurality of coefficients stored in said storage means; and

means for generating a corrected input signal from the contents of said storage means and said input signal.

32. The system according to claim 31, wherein said means for generating a corrected input signal comprises a multiplier.

33. The system according to claim 31, wherein said storage means is divided into regions whereby a particular range of input signal values map to the same coefficient value.

34. The system according to claim 28, further comprising calibration means for dynamically updating said correction means in response to the input signal and the output of said correction means.

35. The system according to claim 28, further comprising an equalizer for compensating the frequency response gain and group delay of said system.

36. The system according to claim 28, wherein said antinoise means comprises:

a variable gain amplifier operative to generate an amplified signal 180 degrees opposite in phase from said input signal; and

gain control means for dynamically controlling the gain of said variable gain amplifier.

37. The system according to claim 36, wherein said gain control means is adapted to receive a manual input control signal from a user which determines the gain of said variable gain amplifier, said user able to vary the location of a quiet zone generated by said system by varying said input control signal.

38. The system according to claim 37, wherein said input control signal is generated by said user remotely from said system and transmitted to said system via wireless communication means.

39. The system according to claim 28, further comprising anti alias filter means for removing alias frequencies from said input signal.

40. The system according to claim 39, wherein said anti alias filter means comprises a low pass filter having a cutoff frequency sufficiently high enough so as to reject frequencies greater then the sampling rate utilized within said system.

41. The system according to claim 28, further comprising a low pass filter operative to reduce oscillations present in the system derived from feedback of the acoustic output field to said input transducer.

42. The system according to claim 28, further comprising delay cancellation means for reducing the effect of echo signals caused by said antinoise means sensed by said input transducer.

43. The system according to claim 42, wherein said delay cancellation means comprises a digital filter whose output is added to the output of said antinoise means.

44. The system according to claim 42, wherein said delay cancellation means comprises a plurality of delay cancellation circuits wherein each delay cancellation circuit is operative to reduce the effect of the echo caused by previous delay cancellation circuits.

45. The system according to claim 43, wherein said digital filter comprises a finite impulse response (FIR) digital filter.

46. The system according to claim 28, further comprising means for sampling the acoustic noise field at a sampling rate approximately 1000 times or greater than the frequency of the noise source.

47. The system according to claim 28, wherein said system is operative to generate a controlled far field quiet zone.

48. The system according to claim 28, further comprising means for sampling a particular point of the noise source having an arbitrary phase and effectively canceling noise radiated from other points of the noise source having the same phase.

49. The system according to claim 28, wherein said input transducer means comprises a single microphone, said output actuator means comprises a plurality of loudspeakers arranged so as to radiate energy over a wide angle.

50. The system according to claim 28, wherein said input transducer means comprises a single microphone, said output actuator means comprises a plurality of loudspeakers arranged in linear fashion, each loudspeaker radiating energy in the same direction so as to create a wall of silence.

51. The system according to claim 28, wherein said input transducer means and said output actuator means are implemented as a single input/output (I/O) hybrid device.

52. The system according to claim 28, further comprising means for generating an audio source from said output actuator means.

53. A method for reducing the effects of a noise source, comprising the steps of:

sensing the acoustic noise field generated by the noise source and generating an input signal therefrom;

generating an acoustic output field that is effective to reduce the level of the acoustic noise field;

adjusting the input signal generated by an input transducer to compensate for the non linear characteristics of said input transducer and an output actuator;

removing from the input signal a portion of the output of the output actuator fed back through said input transducer;

generating a signal corresponding to substantially the noise source by itself; and

generating an antinoise signal opposite in phase to said input signal, generating said acoustic output field from said antinoise signal.

54. A method for reducing the effects of a noise source, comprising the steps of:

sensing the acoustic noise field generated by the noise source and for generating an input signal therefrom;

generating an acoustic output field that is effective to reduce the level of the acoustic noise field;

adjusting the input signal generated by an input transducer to compensate for the non linear characteristics of said input transducer;

removing extraneous signals from said input signal so as to generate a signal corresponding to substantially the noise source alone; and

generating an antinoise signal opposite in phase to said input signal, said output actuator means generating said acoustic output field from said antinoise signal.